

AMENDMENTS TO THE CLAIMS

Please amend claim 16 as shown below. The remaining original claims are cancelled, and new claims 31-59 are set forth below. A complete listing of claims that are, or were, in the instant application are presented as per the revised format permitted under the proposed waiver of 37 CFR § 1.121(a), (b), (c), and (d).

Claims

1. (Cancelled) Isolated DNA molecules comprising nucleotide sequences comprising one or more expression cassettes capable of directing expression of two or three enzymes characteristic for the carotenoid biosynthesis pathway in plant cells selected from the group consisting of:
phytoene synthase derived from a plant and phytoene desaturase derived from fungi;
phytoene synthase derived from a plant and phytoene desaturase derived from bacteria;
phytoene synthase derived from fungi and phytoene desaturase derived from fungi;
phytoene synthase derived from fungi and phytoene desaturase derived from bacteria;
phytoene synthase derived from a plant, phytoene desaturase derived from a plant and ζ -carotene desaturase derived from a plant; and,
phytoene synthase derived from fungi, phytoene desaturase derived from a plant and ζ -carotene desaturase derived from a plant.
2. (Cancelled) The DNA molecules according to claim 1 wherein the expression cassettes comprise suitable constitutive, inducible or tissue-specific promoters operably linked to encoding sequences for the enzymes allowing expression in plant cells, seeds, tissues or whole plants.
3. (Cancelled) The DNA molecules according to claim 1 further comprising at least one selectable marker gene operably linked to a constitutive, inducible or tissue specific promoter sequence.

4. (Cancelled) The DNA molecules according to claim 3 wherein the selectable marker is hygromycin phosphotransferase under control of a constitutive promoter.
5. (Cancelled) The DNA molecules according to claim 1 wherein the plant derived phytoene synthase is expressed under the control of a tissue-specific promoter.
6. (Cancelled) The DNA molecules according to claim 1 wherein the nucleotide sequences further comprise an encoding sequence for phytoene desaturase fused to a suitable plastid transit peptide encoding sequence.
7. (Cancelled) The DNA molecules according to claim 6 wherein both the phytoene desaturase encoding sequence and plastid transit peptide encoding sequence are expressed under control of a tissue specific or constitutive promoter.
8. (Cancelled) The DNA molecules according to claim 6 wherein the plastid transit peptide encoding sequence is derived from the pea Rubisco small subunit (tp).
9. (Cancelled) The DNA molecules according to claim 1 further comprising encoding sequences consisting of a plasmid or a vector system suitable for expression in plant cells.
10. (Cancelled) The DNA molecules according to claim 9 wherein the plasmid or vector system encoding sequence is derived from *Agrobacterium tumefaciens*.
11. (Cancelled) The DNA molecules according to claim 1 wherein the nucleotide sequence comprises phytoene synthase derived from a plant and phytoene desaturase derived from bacteria and the plant cells are normally carotenoid free.

12. (Cancelled) The DNA molecules according to claim 11 wherein the plant cells that are normally carotenoid free consist of rice cells.

13. (Cancelled) A transgenic plant cell, seed, tissue or whole plant that contains one or more DNA molecules according to claim 1.

14. (Cancelled) A transgenic plant cell, seed, tissue or whole plant according to claim 13 selected from the group consisting of eukaryotic alga, embryophytes comprising *Bryophyta*, *Pteridophyta*, *Gymnospermae*, *Magnoliopsida*, *Rosopsida*, and *Liliopsida* ("monocots").

15. (Cancelled) A transgenic plant cell, seed, tissue or whole plant according to claim 14 selected from the group consisting of rice, wheat, barley, oats, amaranth, flax, triticale, rye, corn, *Brassica* seeds, cotton seeds, soybean, safflower, sunflower, coconut, palm, pumpkin, squash, sesame, poppy, grape, mung beans, peanut, peas, beans, radish, alfalfa, cocoa, coffee, hemp, walnuts, almonds, pecans, chick-peas potatoes, carrots, sweet potatoes, tomato, pepper, cassava, willows, oaks, elms, maples, apples, bananas, lilies, orchids, sedges, roses, buttercups, petunias, phlox, violets, and sunflowers.

16. (Currently Amended) A method of transforming producing plant cells, seeds or tissue using the DNA molecules according to claim 1 that accumulate carotenoids which cells are normally carotenoid-free said method comprising transforming plant material with an isolated DNA molecule comprising a nucleotide sequence which comprises:

(a) an expression cassette capable of directing production in said cells of a phytoene synthase derived from a plant; and

(b) an expression cassette capable of directing production in said cells of a phytoene desaturase derived from a plant; and

selecting transformed plant material that comprises the cells that accumulate carotenoids.

17. (Cancelled) A method of transforming plant cells, seeds or tissues according to claim 16 wherein the expression cassettes are present on one or more DNA molecules.
18. (Cancelled) A method according to claim 16 wherein the plant cells, seeds or tissues selected for transformation are normally carotenoid free.
19. (Cancelled) A method according to claim 18 wherein the plant cells, seeds or tissues selected for transformation have a carotenoid content 0.001% w/w or lower.
20. (Cancelled) A transformed whole plant or part thereof regenerated from transformants yielded according to claim 16.
21. (Cancelled) A transformed whole plant or part thereof according to claim 20 selected from the group consisting of eukaryotic alga, embryophytes comprising *Bryophyta*, *Pteridophyta*, *Gymnospermae*, *Magnoliopsida*, *Rosopsida*, and *Liliopsida* ("monocots").
22. (Cancelled) A transformed whole plant or part thereof according to claim 21 selected from the group consisting of rice, wheat, barley, oats, amaranth, flax, triticale, rye, corn, *Brassica* seeds, cotton seeds, soybean, safflower, sunflower, coconut, palm, pumpkin, squash, sesame, poppy, grape, mung beans, peanut, peas, beans, radish, alfalfa, cocoa, coffee, hemp, walnuts, almonds, pecans, chick-peas potatoes, carrots, sweet potatoes, tomato, pepper, cassava, willows, oaks, elms, maples, apples, bananas, lilies, orchids, sedges, roses, buttercups, petunias, phlox, violets, and sunflowers.
23. (Cancelled) A transformed whole plant or part thereof according to claim 20 wherein the plant cells, seeds or tissues are those of rice.
24. (Cancelled) A method of transforming plant cells, seeds or tissues using isolated DNA molecules comprising nucleotide sequences comprising one or more expression

cassettes capable of directing expression of two or three enzymes characteristic for the carotenoid biosynthesis pathway in plant cells selected from the group consisting of: phytoene synthase derived from a bacteria and phytoene desaturase derived from fungi; phytoene synthase derived from a bacteria and phytoene desaturase derived from bacteria; and, phytoene synthase derived from a bacteria, phytoene desaturase derived from a plant and ζ -carotene desaturase derived from a plant.

25. (Cancelled) A method according to claim 24 wherein the plant cells, seeds or tissues selected for transformation are normally carotenoid free.

26. (Cancelled) A method according to claim 25 wherein the plant cells, seeds or tissues selected for transformation have a carotenoid content 0.001% w/w or lower.

27. (Cancelled) A transformed whole plant or part thereof regenerated from transformants yielded according to claim 24.

28. (Cancelled) A transformed whole plant or part thereof according to claim 27 selected from the group consisting of eukaryotic alga, embryophytes comprising *Bryophyta*, *Pteridophyta*, *Gymnospermae*, *Magnoliopsida*, *Rosopsida*, and *Liliopsida* ("monocots").

29. (Cancelled) A transformed whole plant or part thereof according to claim 28 selected from the group consisting of rice, wheat, barley, oats, amaranth, flax, triticale, rye, corn, *Brassica* seeds, cotton seeds, soybean, safflower, sunflower, coconut, palm, pumpkin, squash, sesame, poppy, grape, mung beans, peanut, peas, beans, radish, alfalfa, cocoa, coffee, hemp, walnuts, almonds, pecans, chick-peas potatoes, carrots, sweet potatoes, tomato, pepper, cassava, willows, oaks, elms, maples, apples, bananas, lilies, orchids, sedges, roses, buttercups, petunias, phlox, violets, and sunflowers.

30. (Cancelled) A transformed whole plant or part thereof according to claim 27 wherein the plant cells, seeds or tissues are those of rice.
31. (New) A method according to claim 16 wherein said phytoene desaturase is derived from the CrtI gene of *Erwinia uredovora*.
32. (New) A method according to claim 31 wherein said phytoene desaturase is from the CrtI gene of *Erwinia uredovora*.
33. (New) A method according to claim 16 wherein said phytoene desaturase is fused with a suitable plastid transit peptide.
34. (New) A method according to claim 16 wherein said phytoene desaturase is expressed under the control of a tissue specific or constitutive promoter.
35. (New) A method according to claim 34 wherein said phytoene desaturase is expressed under the control of a constitutive promoter.
36. (New) A method according to claim 16 wherein said phytoene synthase is expressed under the control of a tissue specific promoter.
37. (New) A method according to claim 36 wherein said phytoene synthase is derived from *Narcissus pseudonarcissus*.
38. (New) A method according to claims 16 wherein said DNA further comprises a polynucleotide which provides for a selectable marker.
39. (New) A method according to claim 16 wherein said plant material is transformed via an Agrobacterium which comprises said DNA.
40. (New) A method according to claim 16 wherein said plant cell is a rice plant cell.

41. (New) A method according to claim 16 wherein said cell is an endosperm cell.
42. (New) A transformed plant cell obtainable by a method of claim 16.
43. (New) A plant cell according to claim 42 which is a rice endosperm cell.
44. (New) A transgenic plant cell, seed, tissue or whole plant according to claim 43 selected from the group consisting of rice, wheat, barley, oats, amaranth, flax, triticale, rye, corn, *Brassica* seeds, cotton seeds, soybean, safflower, sunflower, coconut, palm, pumpkin, squash, sesame, poppy, grape, mung beans, peanut, peas, beans, radish, alfalfa, cocoa, coffee, hemp, walnuts, almonds, pecans, chick-peas potatoes, carrots, sweet potatoes, tomato, pepper, cassava, willows, oaks, elms, maples, apples, bananas, lilies, orchids, sedges, roses, buttercups, petunias, phlox, violets, and sunflowers.
45. (New) A method of transforming plant cells, seeds or tissues using the DNA molecules according to claim 16.
46. (New) A method of transforming plant cells, seeds or tissues according to claim 45 wherein the expression cassettes are present on one or more DNA molecules.
47. (New) A method according to claim 45 wherein the plant cells, seeds or tissues selected for transformation are normally carotenoid free.
48. (New) A method according to claim 47 wherein the plant cells, seeds or tissues selected for transformation have a carotenoid content 0.001% w/w or lower.
49. (New) A transformed whole plant or part thereof regenerated from transformants yielded according to claim 45.

50. (New) A transformed whole plant or part thereof according to claim 49 selected from the group consisting of eukaryotic alga, embryophytes comprising *Bryophyta*, *Pteridophyta*, *Gymnospermae*, *Magnoliopsida*, *Rosopsida*, and *Liliopsida*.

51. (New) A transformed whole plant or part thereof according to claim 50 selected from the group consisting of rice, wheat, barley, oats, amaranth, flax, triticale, rye, corn, *Brassica* seeds, cotton seeds, soybean, safflower, sunflower, coconut, palm, pumpkin, squash, sesame, poppy, grape, mung beans, peanut, peas, beans, radish, alfalfa, cocoa, coffee, hemp, walnuts, almonds, pecans, chick-peas potatoes, carrots, sweet potatoes, tomato, pepper, cassava, willows, oaks, elms, maples, apples, bananas, lilies, orchids, sedges, roses, buttercups, petunias, phlox, violets, and sunflowers.

52. (New) A transformed whole plant or part thereof according to claim 20 wherein the plant cells, seeds or tissues are those of rice.

53. (New) A method of transforming plant cells, seeds or tissues using isolated DNA molecules comprising nucleotide sequences comprising one or more expression cassettes capable of directing expression of two or three enzymes characteristic for the carotenoid biosynthesis pathway in plant cells selected from the group consisting of: phytoene synthase derived from a bacteria and phytoene desaturase derived from fungi; phytoene synthase derived from a bacteria and phytoene desaturase derived from bacteria; and, phytoene synthase derived from a bacteria, phytoene desaturase derived from a plant and ζ -carotene desaturase derived from a plant.

54. (New) A method according to claim 53 wherein the plant cells, seeds or tissues selected for transformation are normally carotenoid free.

55. (New) A method according to claim 54 wherein the plant cells, seeds or tissues selected for transformation have a carotenoid content 0.001% w/w or lower.

56. (New) A transformed whole plant or part thereof regenerated from transformants yielded according to claim 53.

57. (New) A transformed whole plant or part thereof according to claim 56 selected from the group consisting of eukaryotic alga, embryophytes comprising *Bryophyta*, *Pteridophyta*, *Gymnospermae*, *Magnoliopsida*, *Rosopsida*, and *Liliopsida*.

58. (New) A transformed whole plant or part thereof according to claim 57 selected from the group consisting of rice, wheat, barley, oats, amaranth, flax, triticale, rye, corn, *Brassica* seeds, cotton seeds, soybean, safflower, sunflower, coconut, palm, pumpkin, squash, sesame, poppy, grape, mung beans, peanut, peas, beans, radish, alfalfa, cocoa, coffee, hemp, walnuts, almonds, pecans, chick-peas potatoes, carrots, sweet potatoes, tomato, pepper, cassava, willows, oaks, elms, maples, apples, bananas, lilies, orchids, sedges, roses, buttercups, petunias, phlox, violets, and sunflowers.

59. (New) A transformed whole plant or part thereof according to claim 56 wherein the plant cells, seeds or tissues are those of rice.